Code No. 3508

FACULTY OF SCIENCE

M.Sc. I - Semester Examination, December 2014

Subject : Physical Chemistry
Paper – III

Time: 3 hours **Max. Marks: 80**

Note: Answer all questions from Part - A and Part - B.
Each question carries 4 marks in Part - A and 12 marks in Part - B.

PART – A (4 x 8 = 32 Marks)

(Short Answer Type)

1 a) State third law of thermodynamics.
b) Write the physical significance of Helmoltz (A) and Gibbs (G) free energies
2 a) Define the terms i) decomposition potential ii) Concentration over potential
b) Briefly explain the elementary treatment of Bjerrums theory of ion association.
3 a) Explain the plancks concept quantization and give the expression for average energy of an oscillator.
b) Write the interpretation of wave function ψ and ψ^2.
4 a) What is Lindmanns theory?
b) Explain the collision theory of reaction rates.

PART – B (4 x 12 = 48 Marks)

(Essay Answer Type)

5 a) Derive the expression for entropy change in mixing of ideal gases.
b) What are Maxwell relations? Show that $\left(\frac{\partial H}{\partial V}\right)_S = -T\left(\frac{\partial P}{\partial H}\right)_V$.

OR

c) Write the Gibbs-Helmoltz equation and explain the dependence of G on T and P.
d) ΔG for a reaction at 300 K is – 16k.cal. ΔH for reaction is – 10k.cal. Calculate the entropy change (ΔS). What will be the ΔG at 330K.
6 a) Derive the Nernst equation and explain terms in it.
b) Write the Debye-Huckel-Onsager equation and explain its limitations and validity.

OR

c) Explain the principle in potentiometric redox titration and cell representation with an example.
d) Explain the Debye-Huckel theory of electrolytic solution and Debye-Huckel limiting law.
7 a) State and explain postulates of quantum mechanics.
b) Show that the eigen value of Hermitian operator is real.

OR

c) Derive the time independent Schrodinger wave equation from time dependant Schrodinger wave equation.
d) What are commutating operators? Show that the commutator of [d/dx, x] is one.
8 a) Write the Hammett equation and explain the reasons for deviations from Hammett's correlations.
b) Explain the reactivity selectivity principle and isoselectivity rule.

OR

c) What is Tafts four parameter equation? Explain the terms in it and its applicability.
d) Write notes on i) Activation parameter ii) Swain-Scott equation

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